

AD \_\_\_\_\_

Award Number: DAMD17-01-1-0809

TITLE: Influences of Nutrition and Physical Forces on Bone  
Structure/Function Properties

PRINCIPAL INVESTIGATOR: Steven A. Goldstein, Ph.D.

CONTRACTING ORGANIZATION: University of Michigan  
Ann Arbor, MI 48109-1274

REPORT DATE: October 2003

TYPE OF REPORT: Annual

PREPARED FOR: U.S. Army Medical Research and Materiel Command  
Fort Detrick, Maryland 21702-5012

DISTRIBUTION STATEMENT: Approved for Public Release;  
Distribution Unlimited

The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision unless so designated by other documentation.

20040220 045

**REPORT DOCUMENTATION PAGE**Form Approved  
OMB No. 074-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503

**1. AGENCY USE ONLY**  
(Leave blank)**2. REPORT DATE**  
October 2003**3. REPORT TYPE AND DATES COVERED**  
Annual (17 Sep 2002 - 16 Sep 2003)**4. TITLE AND SUBTITLE**Influences of Nutrition and Physical Forces on Bone  
Structure/Function Properties**5. FUNDING NUMBERS**

DAMD17-01-1-0809

**6. AUTHOR(S)**

Steven A. Goldstein, Ph.D.

**7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)**University of Michigan  
Ann Arbor, Min48109-1274

E-Mail: stevengld@umich.edu

**8. PERFORMING ORGANIZATION  
REPORT NUMBER****9. SPONSORING / MONITORING  
AGENCY NAME(S) AND ADDRESS(ES)**U.S. Army Medical Research and Materiel Command  
Fort Detrick, Maryland 21702-5012**10. SPONSORING / MONITORING  
AGENCY REPORT NUMBER****11. SUPPLEMENTARY NOTES**

Original contains color plates: ALL DTIC reproductions will be in black and white

**12a. DISTRIBUTION / AVAILABILITY STATEMENT**

Approved for Public Release; Distribution Unlimited

**12b. DISTRIBUTION CODE****13. ABSTRACT (Maximum 200 Words)**

The purpose of this research program is to contribute towards two major objectives in support of advancing our ability to prevent or treat bone failure or fragility:

1. Developing and characterizing methods of evaluating bone properties in animal models that goes beyond measures of bone density and global mechanical properties.
2. Evaluating the influence of physical forces and nutritional status on bone biomechanical integrity.

Specifically, it was the purpose of this study to apply a hierarchical approach to quantifying the properties of murine bone to the level of the extracellular matrix. Furthermore, the study was designed to test hypotheses concerning the interplay between vitamin D and calcium nutritional support and physical forces.

Progress during the second year of study has followed the proposed statement of work. All of the microtesting systems have been fabricated and are being utilized to prepare specimens for study. Most importantly, 394 animals have been entered into the study and the morphology, geometry and mechanical properties of the femurs and vertebrae have been documented for many of the animals. The data demonstrated significant effects of strain and calcium nutrition, with no effect of exercise to date.

**14. SUBJECT TERMS**Bone Biomechanics, Mechanotransduction, Nutrition, Fragility,  
Osteoporosis**15. NUMBER OF PAGES**

30

**16. PRICE CODE****17. SECURITY CLASSIFICATION  
OF REPORT**

Unclassified

**18. SECURITY CLASSIFICATION  
OF THIS PAGE**

Unclassified

**19. SECURITY CLASSIFICATION  
OF ABSTRACT**

Unclassified

**20. LIMITATION OF ABSTRACT**

Unlimited

## Table of Contents

Cover.....	1
SF 298.....	2
Table of Contents.....	3
Introduction.....	4
Body.....	4
Key Research Accomplishments.....	13
Reportable Outcomes.....	14
Conclusions.....	14
References.....	14
Appendices.....	14

## **A. Introduction**

It is well known that the maintenance and adaptation of bone integrity is dependent on a complex interaction of metabolic and environmental factors (mechanical stresses, nutritional status). Unfortunately, the specific relationship between these factors and the biomechanical competence of bone tissue remains incompletely quantified. As a result, strategies for preventing or effectively treating bone fragility or enhancing general bone health are far from being optimized. The specific goals of this research program is to contribute to two major objectives in support of reducing the incidence of fracture:

- a. The development and application of micro-imaging and testing techniques in animal models to study bone structure function properties.
- b. Exploring the influence of calcium and vitamin D metabolism and physical forces on bone integrity.

## **B. Body**

The progress of this research program is described below, as a function of the statements of work that were approved by the USAMRMC. The statement of work was proposed as follows:

1. The acquisition of DBP founder mice and breeding will be performed during year 1 and 2 to produce 180 animals for testing.
2. Mechanical fabrication and calibration of all testing holders and test fixtures will be completed during the first nine months of study. Maintenance, recalibration and replacement of parts will continue years 2 through 4.
3. Micro CT, whole bone testing of DBP mice will be completed years 1 and 2.
4. Microspecimen production and testing of DBP bones will be completed years 2 through 3.
5. Micro CT, Whole bone testing of C57BL/6J and C3H/HeJ bones will be conducted years 1 through 3.
6. Microspecimen testing of C57BL/6J and C3H/HeJ bone will be tested years 2.5 through year 3.5.
7. Raman imaging, SEM, and light microscopy of DBP mice bone will be conducted in years 1 to 3.
8. Raman imaging, SEM, and light microscopy of C57BL/J6 and C3H/HeJ bone will be tested year 2 through 3.5.
9. Final data analyses and correlations across all mice and groups will be completed during year 4.

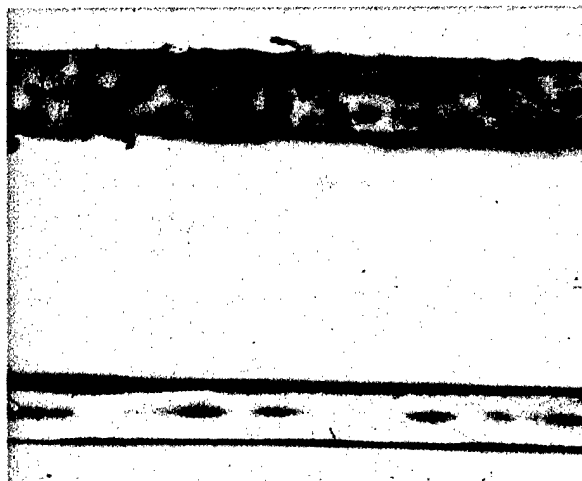
Since most of the tasks were described as objectives to be completed over 1 to 3 years, the progress report can't follow these nine tasks precisely. Instead, we have presented the specific tasks that were proposed for completion during the second year. The tasks are outlined in "bold", followed by a description of the accomplishments.

**The acquisition of DBP founder mice and breeding will be performed during year 1 and 2 to produce the 180 mice for testing**

As noted in the progress report for year one, DBP breeder mice (4 females and 2 males) were obtained from Dr. Nancy Cooke at the University of Pennsylvania. These mice are being used to generate our own population of heterozygote breeders. Due to background noise, homozygous breeders cannot be used. We have also developed protocols for genotyping the newborn mice. We have been producing the population for the past year and performing genotyping to verify that they are homozygote offspring. We will begin to enter these animals into the exercising and nutrition alteration studies in the next couple months. In the original proposal we had planned to enter the DBP mice early in the study and then follow with the other two mouse strains. In an effort to ensure that we enter genotype verified animals in these studies, we switched the order of the studies. As a result we are nearing completion of testing for the C57 black 6 and C3 mice (ahead of schedule). This reorganization did not alter our overall schedule for completion of the program, but followed a more effective experimental logic.

**Mechanical fabrication and calibration of all testing holders and test fixtures will be completed during the first nine months of study. Maintenance, recalibration and replacement of parts will continue years 2 through 4.**

All treadmill and whole bone mechanical testing systems were fabricated and calibrated during year one. The maintenance and calibration procedures have continued during year two. During this past year we successfully completed the fabrication of the micro-milling and micro-testing systems. Figure 1 illustrates a parallelepiped beam machined from the cortical wall of a mouse in comparison to a human hair to demonstrate the scale of the specimen. Four point bending of a microspecimen is shown in Figure 2.



**Figure 1**



**Figure 2**

**Figure 1:** A microspecimen of cortical bone is illustrated (top) as well as a human hair. The specimen was produced using the specialized micro-milling system fabricated for the study.

**Figure 2:** The microspecimens are tested in 4 point bending to failure using the micro-testing machine illustrated above.

### Micro CT and Whole bone testing of C57BL/6 and C3H/HeJ bones will be conducted years 1 through 3

All acquisition, micro CT and whole bone testing is near complete for the C57BL/6J and C3H/HeJ mice. This represents the largest portion of the proposed program and also represents the majority of progress for year two of the program. To best summarize the progress, Table 1 is extracted from our master database to provide the details for all animals entered into the studies. As can be seen, 394 mice have been entered into the study and distributed among the experimental groups. From each of the mice the femora and vertebral bodies have been extracted and then scanned on the micro CT prior to mechanical testing. Table 2 illustrates the progress for the femoral analysis. As shown, 361 femurs have been scanned and analyzed and 128 have already been mechanically tested. Table 3 illustrates progress for the vertebral analysis. 349 vertebrae have been scanned and analyzed and the mechanical testing will begin in the next two to three months.

Mice Completed in Study

Strain of Mouse	Diet	Exercise (yes or no)	Male or Female	Period 1 (July 1-Sept 23)		Period 2 (Sept 23 -Dec 9)		Period 3 (Jan 6-March 24)		Period 4 (March 24-June 2)		Period 5 (June 2-Aug 11)		Period 6 (Aug 20 - )		Total
				Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Group 11	Group 12	
C57BL/6J	low	yes	Male	3	0	2	0	4	0	4	0	0	1	3		17
	norm	yes	Male	0	4	0	4	0	3	0	4	2	0			17
	high	yes	Male	1	0	4	0	3	0	4	0	1	1	3		17
C57BL/6J	low	no	Male	4	0	4	0	4	0	4	0	0	0			16
	norm	no	Male	0	4	0	4	0	4	0	4	0	0			16
	high	no	Male	4	0	3	0	4	0	4	0	1	0			16
C57BL/6J	low	yes	Female	0	3	0	3	0	4	0	4	1	0			15
	norm	yes	Female	4	0	3	0	3	0	4	0	0	0	4		18
	high	yes	Female	0	3	0	6	0	4	0	4	0	1			18
C57BL/6J	low	no	Female	0	4	0	4	0	4	0	4	0	0			16
	norm	no	Female	4	0	2	0	4	0	6	0	0	0			16
	high	no	Female	0	4	0	4	2	2	0	4	0	0			16
C3H/HeJ	low	yes	Male	4	0	0	0	4	0	4	0	3	0			15
	norm	yes	Male	0	4	0	0	0	4	0	4	0	3	1		16
	high	yes	Male	4	0	0	0	4	0	4	0	3	0	1		16
C3H/HeJ	low	no	Male	4	0	0	0	3	0	4	0	3	0	6		20
	norm	no	Male	0	4	0	0	0	4	2	6	0	0			16
	high	no	Male	4	0	0	0	4	0	3	0	5	0			16
C3H/HeJ	low	yes	Female	0	4	0	0	0	4	0	4	0	0	6		18
	norm	yes	Female	3	0	0	0	4	0	4	0	3	0	2		16
	high	yes	Female	0	4	0	0	0	3	0	4	0	4			15
C3H/HeJ	low	no	Female	0	4	0	0	0	4	0	3	0	2	4		17
	norm	no	Female	4	0	0	0	4	0	4	0	2	0	0	0	14
	high	no	Female	0	4	0	0	2	0	0	6	0	2	0	3	17
				43	46	18	25	49	40	51	24	14	30	3		394

**Table 1:** Database of mice entered into studies

Femora									
Strain of Mouse	Diet	Exercise (yes or no)	Male or Female	# scanned	# analyzed	# mechanical tested	# Euthanized	# Left (Currently Exercising)	Total in Group
C57BL/6J	low	yes	Male	14	14	5	0	3	17
	norm	yes	Male	17	17	8	0	0	17
	high	yes	Male	14	14	5	0	3	17
C57BL/6J	low	no	Male	16	16	7	0	0	16
	norm	no	Male	16	16	7	0	0	16
	high	no	Male	16	16	7	0	0	16
C57BL/6J	low	yes	Female	15	15	5	0	0	15
	norm	yes	Female	14	14	7	0	4	18
	high	yes	Female	18	18	9	0	0	18
C57BL/6J	low	no	Female	16	16	7	0	0	16
	norm	no	Female	16	16	6	0	0	16
	high	no	Female	16	16	8	0	0	16
C3H/HeJ	low	yes	Male	15	15	4	0	0	15
	norm	yes	Male	15	15	4	0	2	17
	high	yes	Male	15	15	4	0	2	17
C3H/HeJ	low	no	Male	14	14	4	0	6	20
	norm	no	Male	16	16	4	0	0	16
	high	no	Male	16	16	4	0	0	16
C3H/HeJ	low	yes	Female	12	12	4	0	6	18
	norm	yes	Female	14	14	3	0	2	16
	high	yes	Female	15	15	4	0	0	15
C3H/HeJ	low	no	Female	13	13	4	0	4	17
	norm	no	Female	14	14	4	0	1	15
	high	no	Female	14	14	4	0	3	17
total				361	361	128	0	36	397

**Table 2:** Database for femoral studies

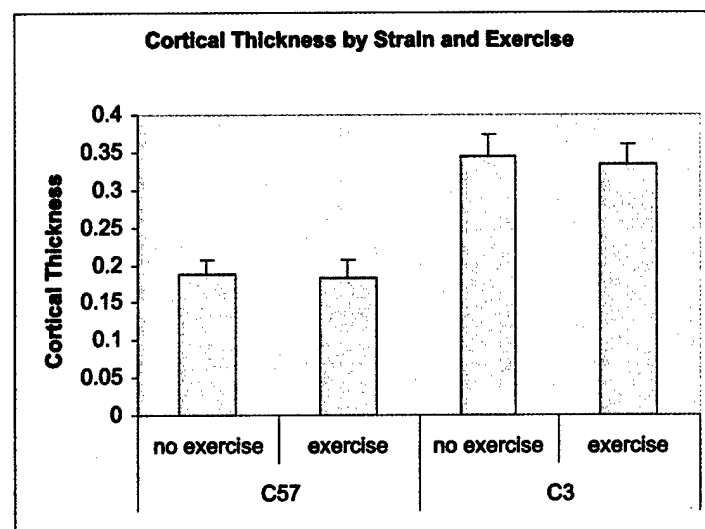
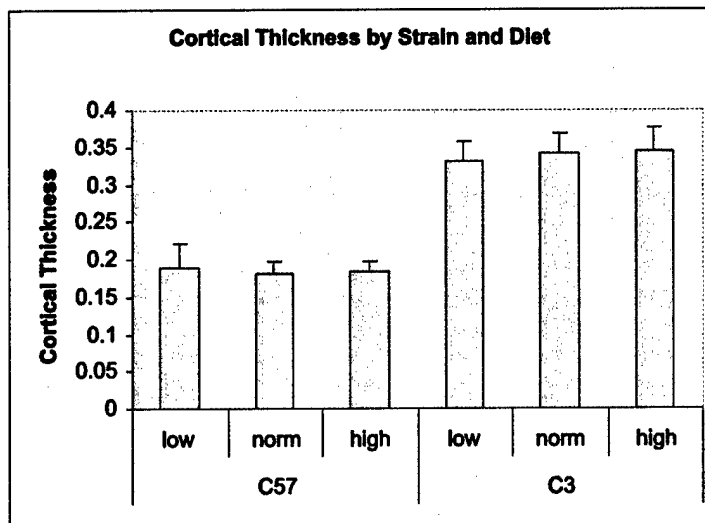
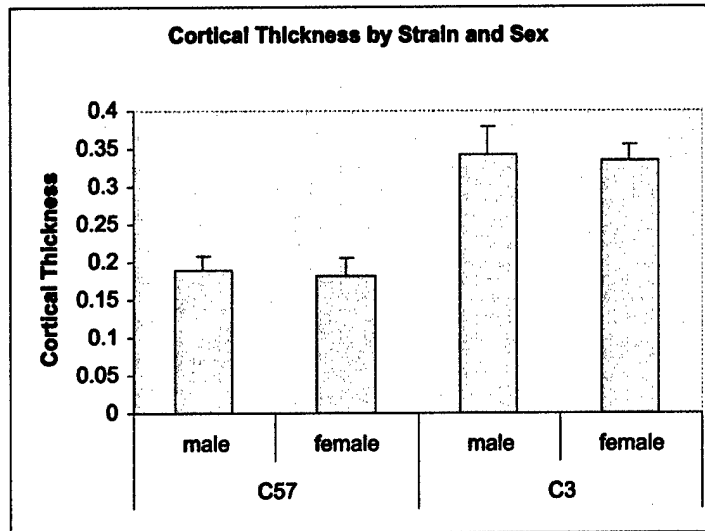
Strain of Mouse	Diet	Exercise (yes or no)	Male or Female	# scanned	# analyzed	# mechanical tested	# Euthanized	# Left (Currently Exercising)	Total in Group
C57BL/6J	low	yes	Male	18	18	0	0	3	21
	norm	yes	Male	17	17	0	0	0	17
	high	yes	Male	13	13	0	0	3	16
C57BL/6J	low	no	Male	15	15	0	0	0	15
	norm	no	Male	16	16	0	0	0	16
	high	no	Male	15	15	0	0	0	15
C57BL/6J	low	yes	Female	15	15	0	0	0	15
	norm	yes	Female	14	14	0	0	4	18
	high	yes	Female	17	17	0	0	0	17
C57BL/6J	low	no	Female	16	16	0	0	0	16
	norm	no	Female	16	16	0	0	0	16
	high	no	Female	15	15	0	0	0	15
C3H/HeJ	low	yes	Male	11	11	0	0	0	11
	norm	yes	Male	14	14	0	0	2	16
	high	yes	Male	14	14	0	0	2	16
C3H/HeJ	low	no	Male	12	12	0	0	6	18
	norm	no	Male	15	15	0	0	0	15
	high	no	Male	16	16	0	0	0	16
C3H/HeJ	low	yes	Female	11	11	0	0	6	17
	norm	yes	Female	14	14	0	0	2	16
	high	yes	Female	15	15	0	0	0	15
C3H/HeJ	low	no	Female	13	13	0	0	4	17
	norm	no	Female	14	14	0	0	1	15
	high	no	Female	13	13	0	0	3	16
<b>total</b>				349	349	0	0	36	385

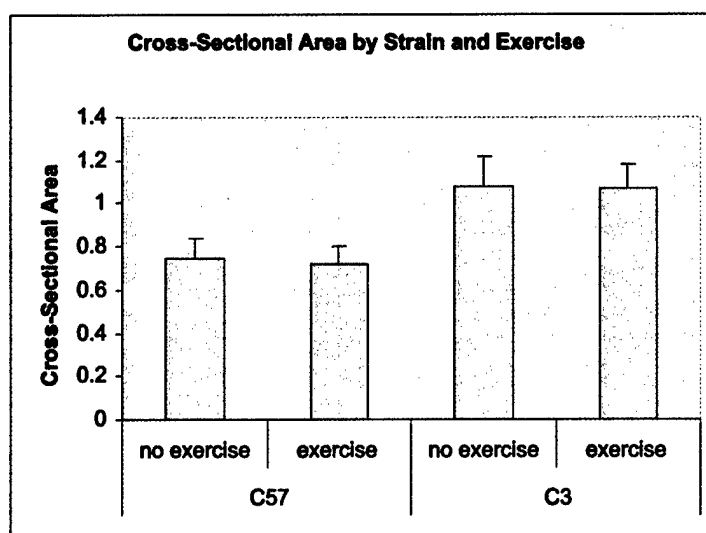
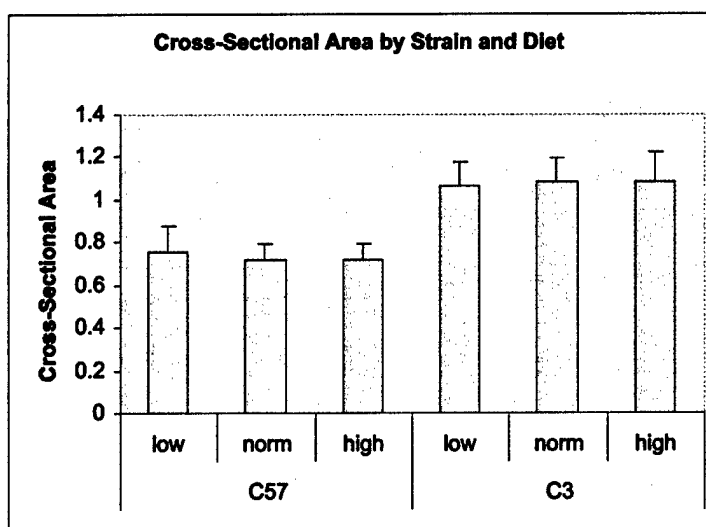
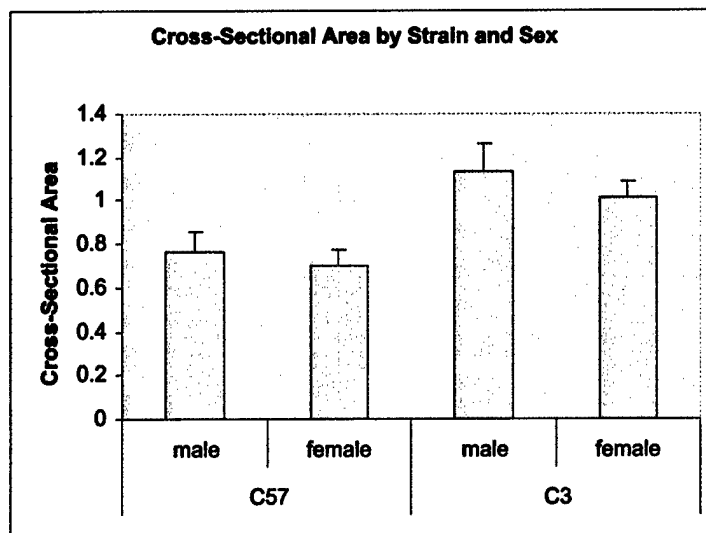
**Table 3: Vertebral database**

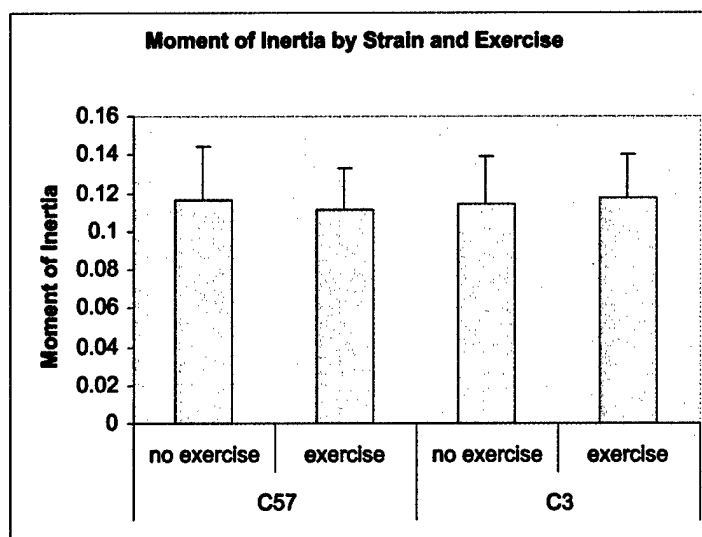
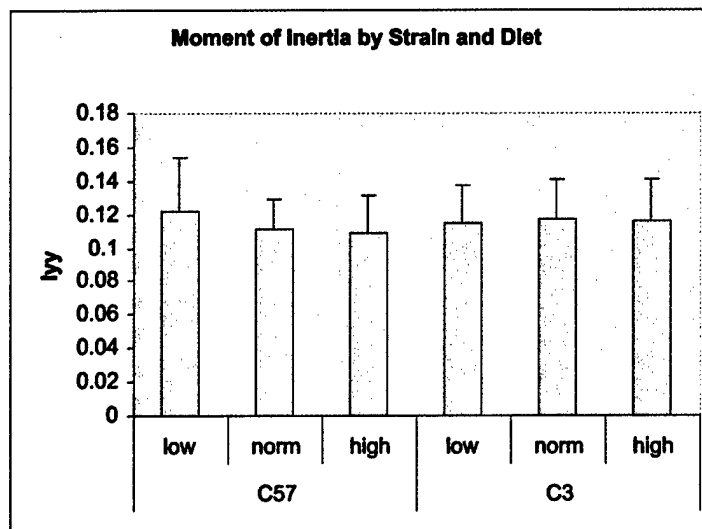
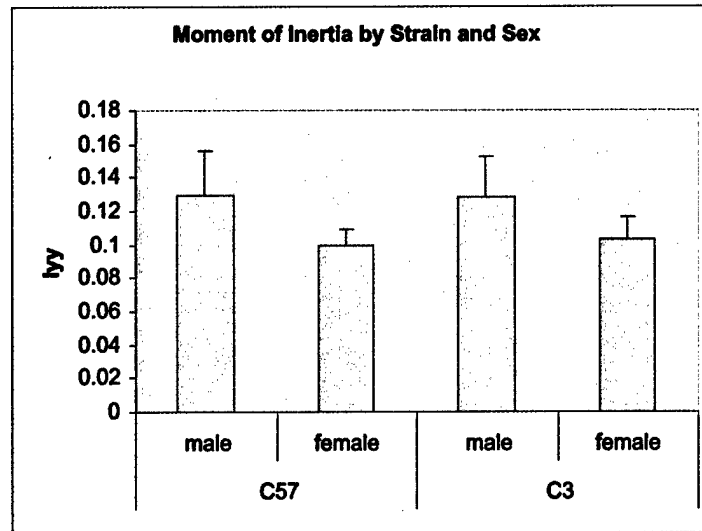
## Research Results

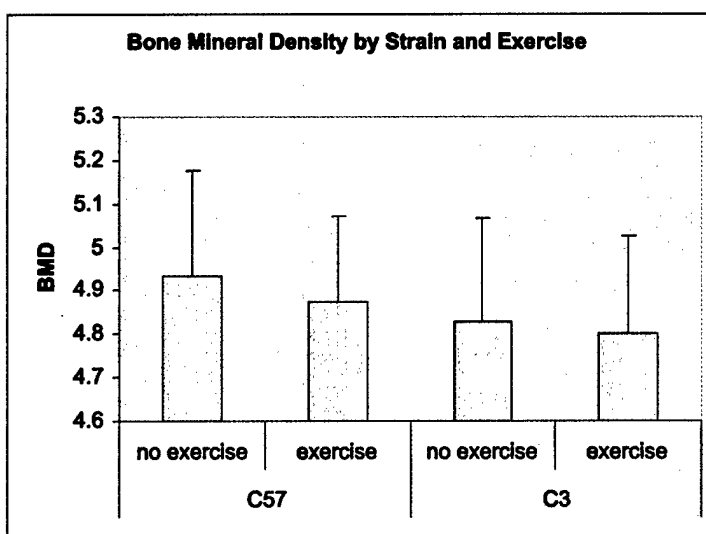
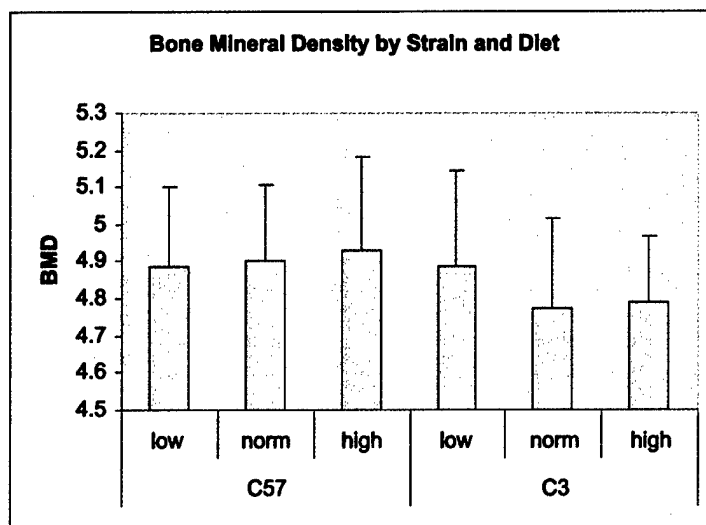
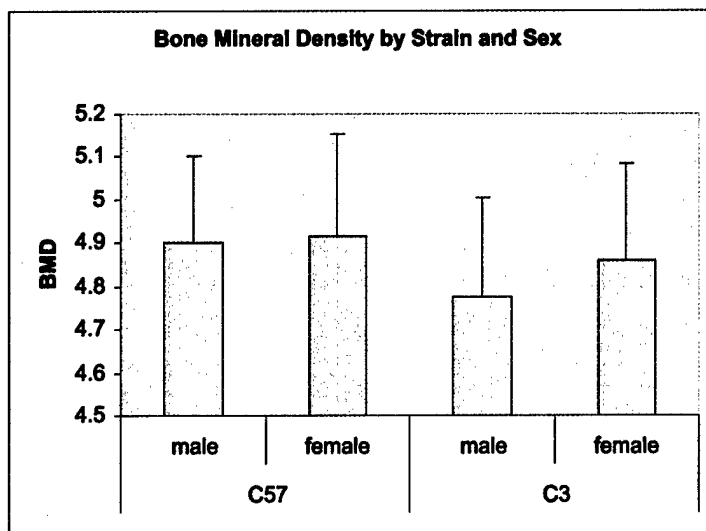
Although preliminary, we have generated a number of findings to date from the micro CT and mechanical analyses performed to date. The data can be summarized by the following graphs:











For the vertebral analysis, the data can be summarized by the following tables:

Exercise Effects on Proximal Trabecular Parameters

Exercise	N	Bone Volume Fraction (%)	Bone Surface to Volume Ratio (mm <sup>2</sup> /mm <sup>3</sup> )	Trabecular Thickness (mm)
No	16	40.9 (0.07)	30.08 (4.57)	0.074 (0.01)
Yes	14	41.9 (0.06)	29.30 (4.44)	0.077 (0.01)

Data are given as mean (STD)

Dietary Effects on Proximal Trabecular Parameters

Dietary Calcium	N	Bone Volume Fraction (%)	Bone Surface to Volume Ratio (mm <sup>2</sup> /mm <sup>3</sup> )	Trabecular Thickness (mm)
Low	10	40.6 (0.07)*	30.29 (4.01)*	0.073 (0.01)*
Normal	10	42.8 (0.07)*	29.18 (5.26)*	0.078 (0.02)*
High	10	40.6 (0.06)*	29.69 (4.07)*	0.075 (0.01)*

Data are given as mean (STD)

\* Significant,  $p \leq 0.05$

**C. Key Research Finding**

- Micro-milling and micro-testing systems fabricated and functioning
- 394 mice entered into study to evaluate effects of gender, strain, nutrition and exercise on morphology and mechanical properties of bone
- DBP mice colony is nearing completion and will be entered into exercise protocols.
- Mouse strain had a significant effect on femoral geometric parameters. C57BL/6J mice had a significantly smaller cross-sectional area and cortical thickness as compared to the C3H/HeJ mice.
- Exercise did not have a significant effect on any of the femoral geometric parameters.
- In vertebra, the normal dietary calcium group had a significantly higher bone volume fraction as compared to the low ( $p=0.003$ ) and high ( $p=0.003$ ) groups. The bone surface to volume ratio of the normal group was shown to be significantly lower than the low dietary calcium group ( $p=0.030$ ), however no significant differences were seen between any of the other groupings.
- In vertebra, the normal dietary calcium group had a significantly higher trabecular thickness as compared to the low group ( $p<0.000$ ) and marginally significant as compared to the high ( $p=0.051$ ) group.

#### **D. Reportable Outcomes**

An abstract was submitted for presentation to the 50<sup>th</sup> Orthopaedic Research Society Meeting to be held in San Francisco in March 2004. The title of the abstract is:

Influence of nutrition and physical forces on bone structure/function properties.

\*Kriegel, JM, \*Oyserman, S, \*Roller, SA, \*Blumenfeld J, \*Volkman SK, \*Nashi S, \*Hall JM, \*McCreadie, BR and \*Goldstein, SA.

#### **E. Conclusions**

The second year of work has been very successful and productive. We have entered and analyzed a very large number of animals in to the study and have maintained the timetable originally proposed in the program. The first data of femoral and vertebral bone demonstrate significant effects of mouse strain and dietary calcium levels. The studies have also demonstrated the ability of the micro-imaging and testing protocols to determine the effects of a variety of factors on bone structure and function properties.

#### **F. References**

None

#### **G. Appendices**

We have included the mouse census database for all animals entered into the studies.

Mouse ID	Cage ID	Group	Mark	Sex	Strain	DOB	Diet	Exercise	Femur			Vertebrae		
									Scan	Analy.	Mech.	Scan	Analy.	Mech.
2	1a	1a	R	M	C57	4/21/02	Low	Yes	1	1	1	1	1	0
9	1b		L	M	C57	4/21/02	Low	Yes	1	1	1	1	1	0
16	1c		B	M	C57	4/21/02	Low	Yes	1	1	1	1	1	0
23	1d		N	M	C57	4/21/02	Low	Yes	0	0	0	0	0	0
30	2	1b	R	M	C57	4/21/02	Low	No	1	1	1	1	1	0
37	2		L	M	C57	4/21/02	Low	No	1	1	1	1	1	0
44	2		B	M	C57	4/21/02	Low	No	1	1	1	1	1	0
51	2		N	M	C57	4/21/02	Low	No	1	1	1	1	1	0
58	3	1a	R	F	C57	4/21/02	Norm	Yes	1	1	1	1	1	0
65	3		L	F	C57	4/21/02	Norm	Yes	1	1	1	0	0	0
72	3		B	F	C57	4/21/02	Norm	Yes	1	1	1	1	1	0
79	3		N	F	C57	4/21/02	Norm	Yes	1	1	1	1	1	0
86	4	1b	R	F	C57	4/21/02	Norm	No	1	1	1	1	1	0
93	4		L	F	C57	4/21/02	Norm	No	1	1	1	1	1	0
100	4		B	F	C57	4/21/02	Norm	No	1	1	1	1	1	0
107	4		N	F	C57	4/21/02	Norm	No	1	1	1	1	1	0
114	5a	1a	R	M	C57	4/21/02	High	Yes	0	0	0	0	0	0
121	5b		L	M	C57	4/21/02	High	Yes	0	0	0	0	0	0
128	5c		B	M	C57	4/21/02	High	Yes	1	1	1	1	1	0
135	5d		N	M	C57	4/21/02	High	Yes	0	0	0	0	0	0
142	6	1b	R	M	C57	4/21/02	High	No	1	1	1	1	1	0
149	6		L	M	C57	4/21/02	High	No	1	1	1	1	1	0
156	6		B	M	C57	4/21/02	High	No	1	1	1	1	1	0
163	6		N	M	C57	4/21/02	High	No	1	1	1	1	1	0
170	7	1a	R	M	C3	4/21/02	Low	Yes	1	1	1	1	1	0
177	7		L	M	C3	4/21/02	Low	Yes	1	1	1	1	1	0
184	7		B	M	C3	4/21/02	Low	Yes	1	1	1	1	1	0

Mouse ID	Cage ID	Group	Mark	Sex	Strain	DOB	Diet	Exercise	Scan	Analy.	Mech.	Scan	Analy.	Mech.
191	7		N	M	C3	4/21/02	Low	Yes	1	1	1	1	1	0
198	8	1b	R	M	C3	4/21/02	Low	No	1	1	1	1	1	0
205	8		L	M	C3	4/21/02	Low	No	1	1	1	1	1	0
212	8		B	M	C3	4/21/02	Low	No	1	1	1	1	1	0
219	8		N	M	C3	4/21/02	Low	No	1	1	1	1	1	0
226	9	1a	R	F	C3	4/21/02	Norm	Yes	1	1	1	1	1	0
233	9		L	F	C3	4/21/02	Norm	Yes	1	1	1	1	1	0
240	9		B	F	C3	4/21/02	Norm	Yes	0	0	0	0	0	0
247	9		N	F	C3	4/21/02	Norm	Yes	1	1	1	1	1	0
254	10	1b	R	F	C3	4/21/02	Norm	No	1	1	1	1	1	0
261	10		L	F	C3	4/21/02	Norm	No	1	1	1	1	1	0
268	10		B	F	C3	4/21/02	Norm	No	1	1	1	1	1	0
275	10		N	F	C3	4/21/02	Norm	No	1	1	1	1	1	0
282	11	1a	R	M	C3	4/21/02	High	Yes	1	1	1	1	1	0
289	11		L	M	C3	4/21/02	High	Yes	1	1	1	1	1	0
296	11		B	M	C3	4/21/02	High	Yes	1	1	1	1	1	0
303	11		N	M	C3	4/21/02	High	Yes	1	1	1	1	1	0
310	12	1b	R	M	C3	4/21/02	High	No	1	1	1	1	1	0
317	12		L	M	C3	4/21/02	High	No	1	1	1	1	1	0
324	12		B	M	C3	4/21/02	High	No	1	1	1	1	1	0
331	12		N	M	C3	4/21/02	High	No	1	1	1	1	1	0
338	13	2a	R	F	C57	4/28/02	Low	Yes	1	1	1	1	1	0
345	13		L	F	C57	4/28/02	Low	Yes	1	1	1	1	1	0
352	13		B	F	C57	4/28/02	Low	Yes	0	0	0	0	0	0
359	13		N	F	C57	4/28/02	Low	Yes	1	1	1	1	1	0
366	14	2b	R	F	C57	4/28/02	Low	No	1	1	1	1	1	0
373	14		L	F	C57	4/28/02	Low	No	1	1	1	1	1	0
380	14		B	F	C57	4/28/02	Low	No	1	1	1	1	1	0



Mouse ID	Cage ID	Group	Mark	Sex	Strain	DOB	Diet	Exercise	Scan	Analy.	Mech.	Scan	Analy.	Mech.
387	14		N	F	C57	4/28/02	Low	No	1	1	1	1	1	0
394	15a	2a	R	M	C57	4/28/02	Norm	Yes	1	1	1	1	1	0
401	15b		L	M	C57	4/28/02	Norm	Yes	1	1	1	1	1	0
408	15c		B	M	C57	4/28/02	Norm	Yes	1	1	1	1	1	0
415	15d		N	M	C57	4/28/02	Norm	Yes	1	1	1	1	1	0
422	16	2b	R	M	C57	4/28/02	Norm	No	1	1	1	1	1	0
429	16		L	M	C57	4/28/02	Norm	No	1	1	1	1	1	0
436	16		B	M	C57	4/28/02	Norm	No	1	1	1	1	1	0
443	16		N	M	C57	4/28/02	Norm	No	1	1	1	1	1	0
450	17	2a	R	F	C57	4/28/02	High	Yes	1	1	1	1	1	0
457	17		L	F	C57	4/28/02	High	Yes	0	0	0	0	0	0
464	17		B	F	C57	4/28/02	High	Yes	1	1	1	1	1	0
471	17		N	F	C57	4/28/02	High	Yes	1	1	1	1	1	0
478	18	2b	R	F	C57	4/28/02	High	No	1	1	1	1	1	0
485	18		L	F	C57	4/28/02	High	No	1	1	1	1	1	0
492	18		B	F	C57	4/28/02	High	No	1	1	1	1	1	0
499	18		N	F	C57	4/28/02	High	No	1	1	1	1	1	0
506	19	2a	R	F	C3	4/28/02	Low	Yes	1	1	1	1	1	0
513	19		L	F	C3	4/28/02	Low	Yes	1	1	1	1	1	0
520	19		B	F	C3	4/28/02	Low	Yes	1	1	1	1	1	0
527	19		N	F	C3	4/28/02	Low	Yes	1	1	1	1	1	0
534	20	2b	R	F	C3	4/28/02	Low	No	1	1	1	1	1	0
541	20		L	F	C3	4/28/02	Low	No	1	1	1	1	1	0
548	20		B	F	C3	4/28/02	Low	No	1	1	1	1	1	0
555	20		N	F	C3	4/28/02	Low	No	1	1	1	1	1	0
562	21	2a	R	M	C3	4/28/02	Norm	Yes	1	1	1	1	1	0
569	21		L	M	C3	4/28/02	Norm	Yes	1	1	1	1	1	0
576	21		B	M	C3	4/28/02	Norm	Yes	1	1	1	1	1	0

Mouse ID	Cage ID	Group	Mark	Sex	Strain	DOB	Diet	Exercise	Scan	Analy.	Mech.	Scan	Analy.	Mech.
583	21		N	M	C3	4/28/02	Norm	Yes	1	1	1	1	1	0
590	22	2b	R	M	C3	4/28/02	Norm	No	1	1	1	1	1	0
597	22		L	M	C3	4/28/02	Norm	No	1	1	1	1	1	0
604	22		B	M	C3	4/28/02	Norm	No	1	1	1	1	1	0
611	22		N	M	C3	4/28/02	Norm	No	1	1	1	1	1	0
618	23	2a	R	F	C3	4/28/02	High	Yes	1	1	1	1	1	0
625	23		L	F	C3	4/28/02	High	Yes	1	1	1	1	1	0
632	23		B	F	C3	4/28/02	High	Yes	1	1	1	1	1	0
639	23		N	F	C3	4/28/02	High	Yes	1	1	1	1	1	0
646	24	2b	R	F	C3	4/28/02	High	No	1	1	1	1	1	0
653	24		L	F	C3	4/28/02	High	No	1	1	1	1	1	0
660	24		B	F	C3	4/28/02	High	No	1	1	1	1	1	0
667	24		N	F	C3	4/28/02	High	No	1	1	1	1	1	0
674	25a	3a	R	M	C57	7/17/02	Low	Yes	1	1	1	1	1	0
681	25b		L	M	C57	7/17/02	Low	Yes	0	0	0	0	0	0
688	25c		B	M	C57	7/17/02	Low	Yes	1	1	1	1	1	0
695	25d		N	M	C57	7/17/02	Low	Yes	0	0	0	0	0	0
702	26	3b	R	M	C57	7/17/02	Low	No	1	1	1	1	1	0
709	26		L	M	C57	7/17/02	Low	No	1	1	1	1	1	0
716	26		B	M	C57	7/17/02	Low	No	1	1	0	1	1	0
723	26		N	M	C57	7/17/02	Low	No	1	1	1	1	1	0
730	27	3a	R	F	C57	7/17/02	Norm	Yes	1	1	1	1	1	0
737	27		L	F	C57	7/17/02	Norm	Yes	1	1	1	1	1	0
744	27		B	F	C57	7/17/02	Norm	Yes	1	1	1	1	1	0
751	27		N	F	C57	7/17/02	Norm	Yes	0	0	0	1	1	0
758	28	3b	R	F	C57	7/17/02	Norm	No	0	0	0	0	0	0
765	28		L	F	C57	7/17/02	Norm	No	1	1	1	1	1	0
772	28		B	F	C57	7/17/02	Norm	No	0	0	0	0	0	0

Mouse ID	Cage ID	Group	Mark	Sex	Strain	DOB	Diet	Exercise	Scan	Analy.	Mech.	Scan	Analy.	Mech.
779	28		N	F	C57	7/17/02	Norm	No	1	1	1	1	1	0
786	29a	3a	R	M	C57	7/17/02	High	Yes	1	1	1	1	1	0
793	29b		L	M	C57	7/17/02	High	Yes	1	1	1	1	1	0
800	29c		B	M	C57	7/17/02	High	Yes	1	1	1	1	1	0
807	29d		N	M	C57	7/17/02	High	Yes	1	1	1	1	1	0
814	30	3b	R	M	C57	7/17/02	High	No	0	0	0	0	0	0
821	30		L	M	C57	7/17/02	High	No	1	1	1	1	1	0
828	30		B	M	C57	7/17/02	High	No	1	1	1	1	1	0
835	30		N	M	C57	7/17/02	High	No	1	1	1	1	1	0
842	31	4a	R	F	C57	7/24/02	Low	Yes	0	0	0	0	0	0
849	31		L	F	C57	7/24/02	Low	Yes	1	1	1	1	1	0
856	31		B	F	C57	7/24/02	Low	Yes	1	1	1	1	1	0
863	31		N	F	C57	7/24/02	Low	Yes	1	1	0	1	1	0
870	32	4b	R	F	C57	7/24/02	Low	No	1	1	1	1	1	0
877	32		L	F	C57	7/24/02	Low	No	1	1	1	1	1	0
884	32		B	F	C57	7/24/02	Low	No	1	1	1	1	1	0
891	32		N	F	C57	7/24/02	Low	No	1	1	0	1	1	0
898	33a	4a	R	M	C57	7/24/02	Norm	Yes	1	1	1	1	1	0
905	33b		L	M	C57	7/24/02	Norm	Yes	1	1	1	1	1	0
912	33c		B	M	C57	7/24/02	Norm	Yes	1	1	1	1	1	0
919	33d		N	M	C57	7/24/02	Norm	Yes	1	1	1	1	1	0
926	34	4b	R	M	C57	7/24/02	Norm	No	1	1	1	1	1	0
933	34		L	M	C57	7/24/02	Norm	No	1	1	1	1	1	0
940	34		B	M	C57	7/24/02	Norm	No	1	1	0	1	1	0
947	34		N	M	C57	7/24/02	Norm	No	1	1	1	1	1	0
954	35	4a	R	F	C57	7/24/02	High	Yes	1	1	1	1	1	0
961	35		L	F	C57	7/24/02	High	Yes	1	1	1	1	1	0
968	35		B	F	C57	7/24/02	High	Yes	1	1	1	1	1	0

Mouse ID	Cage ID	Group	Mark	Sex	Strain	DOB	Diet	Exercise	Scan	Analy.	Mech.	Scan	Analy.	Mech.
975	35		N	F	C57	7/24/02	High	Yes	1	1	1	1	1	0
982	36	4b	R	F	C57	7/24/02	High	No	1	1	1	1	1	0
989	36		L	F	C57	7/24/02	High	No	1	1	1	1	1	0
996	36		B	F	C57	7/24/02	High	No	1	1	1	1	1	0
1003	36		N	F	C57	7/24/02	High	No	1	1	1	1	1	0
1010	37a	4a	R	F	C57	7/24/02	High	Yes	1	1	1	0	0	0
1017	37b		L	F	C57	7/24/02	High	Yes	1	1	1	1	1	0
1024	38	5b	R	M	C57	#####	Low	No	1	1	0	1	1	0
1031	38		L	M	C57	#####	Low	No	1	1	0	1	1	0
1038	38		B	M	C57	#####	Low	No	1	1	0	1	1	0
1045	38		N	M	C57	#####	Low	No	1	1	0	1	1	0
1052	39a	5a	R	M	C57	#####	Low	Yes	1	1	0	1	1	0
1059	39b		L	M	C57	#####	Low	Yes	1	1	0	1	1	0
1066	39c		B	M	C57	#####	Low	Yes	1	1	0	1	1	0
1073	39d		N	M	C57	#####	Low	Yes	1	1	0	1	1	0
1080	40	5b	R	F	C57	#####	Norm	No	1	1	0	1	1	0
1087	40		L	F	C57	#####	Norm	No	1	1	0	1	1	0
1094	40		B	F	C57	#####	Norm	No	1	1	0	1	1	0
1101	40		N	F	C57	#####	Norm	No	1	1	0	1	1	0
1108	41	5a	R	F	C57	#####	Norm	Yes	1	1	0	1	1	0
1115	41		L	F	C57	#####	Norm	Yes	1	1	0	1	1	0
1122	41		B	F	C57	#####	Norm	Yes	0	0	0	0	0	0
1129	41		N	F	C57	#####	Norm	Yes	1	1	0	1	1	0
1136	42	5b	R	M	C57	#####	High	No	1	1	0	1	1	0
1143	42		L	M	C57	#####	High	No	1	1	0	1	1	0
1150	42		B	M	C57	#####	High	No	1	1	0	1	1	0
1157	42		N	M	C57	#####	High	No	1	1	0	1	1	0
1164	43a	5a	R	M	C57	#####	High	Yes	1	1	0	1	1	0

Mouse ID	Cage ID	Group	Mark	Sex	Strain	DOB	Diet	Exercise	Scan	Analy.	Mech.	Scan	Analy.	Mech.
1171	43b		L	M	C57	#####	High	Yes	1	1	0	1	1	0
1178	43e		B	M	C57	#####	High	Yes	0	0	0	0	0	0
1185	43d		N	M	C57	#####	High	Yes	1	1	0	1	1	0
1192	44 5b		R	M	C3	#####	Low	No	1	1	0	1	1	0
1199	44		L	M	C3	37557	Low	No	0	0	0	0	0	0
1206	44		B	M	C3	#####	Low	No	1	1	0	1	1	0
1213	44		N	M	C3	#####	Low	No	1	1	0	1	1	0
1220	45 5a		R	M	C3	#####	Low	Yes	1	1	0	1	1	0
1227	45		L	M	C3	#####	Low	Yes	1	1	0	1	1	0
1234	45		B	M	C3	#####	Low	Yes	1	1	0	1	1	0
1241	45		N	M	C3	#####	Low	Yes	1	1	0	1	1	0
1248	46 5b		R	F	C3	#####	Norm	No	1	1	0	1	1	0
1255	46		L	F	C3	#####	Norm	No	1	1	0	1	1	0
1262	46		B	F	C3	#####	Norm	No	1	1	0	1	1	0
1269	46		N	F	C3	#####	Norm	No	1	1	0	1	1	0
1276	47 5a		R	F	C3	#####	Norm	Yes	1	1	0	1	1	0
1283	47		L	F	C3	#####	Norm	Yes	1	1	0	1	1	0
1290	47		B	F	C3	#####	Norm	Yes	1	1	0	1	1	0
1297	47		N	F	C3	#####	Norm	Yes	1	1	0	1	1	0
1304	48 5b		R	M	C3	#####	High	No	1	1	0	1	1	0
1311	48		L	M	C3	#####	High	No	1	1	0	1	1	0
1318	48		B	M	C3	#####	High	No	1	1	0	1	1	0
1325	48		N	M	C3	#####	High	No	1	1	0	1	1	0
1332	49 5a		R	M	C3	#####	High	Yes	1	1	0	1	1	0
1339	49		L	M	C3	#####	High	Yes	1	1	0	1	1	0
1346	49		B	M	C3	#####	High	Yes	1	1	0	1	1	0
1353	49		N	M	C3	#####	High	Yes	1	1	0	1	1	0
1360	50a 5b		R	F	C57	#####	High	No	1	1	0	1	1	0

Mouse ID	Cage ID	Group	Mark	Sex	Strain	DOB	Diet	Exercise	Scan	Analy.	Mech.	Scan	Analy.	Mech.
1367	50a		N	F	C57	#####	High	No	1	1	0	1	1	0
1374	50b		R	F	C3	#####	High	No	1	1	0	1	1	0
1381	50b		N	F	C3	#####	High	No	1	1	0	1	1	0
1388	51 6a		R	F	C57	11/4/02	Low	Yes	1	1	0	1	1	0
1395	51		L	F	C57	11/4/02	Low	Yes	1	1	0	1	1	0
1402	51		B	F	C57	11/4/02	Low	Yes	1	1	0	1	1	0
1409	51		N	F	C57	11/4/02	Low	Yes	1	1	0	1	1	0
1416	52 6b		R	M	C57	11/4/02	Norm	No	1	1	0	1	1	0
1423	52		L	M	C57	11/4/02	Norm	No	1	1	0	1	1	0
1430	52		B	M	C57	11/4/02	Norm	No	1	1	0	1	1	0
1437	52		N	M	C57	11/4/02	Norm	No	1	1	0	1	1	0
1444	53a 6a		R	M	C57	11/4/02	Norm	Yes	1	1	0	1	1	0
1451	53b		L	M	C57	11/4/02	Norm	Yes	0	0	0	0	0	0
1458	53c		B	M	C57	11/4/02	Norm	Yes	1	1	0	1	1	0
1465	53d		N	M	C57	11/4/02	Norm	Yes	1	1	0	1	1	0
1472	54 6b		R	F	C57	11/4/02	High	No	1	1	0	1	1	0
1479	54		L	F	C57	11/4/02	High	No	0	0	0	0	0	0
1486	54		B	F	C57	11/4/02	High	No	0	0	0	0	0	0
1493	54		N	F	C57	11/4/02	High	No	1	1	0	1	1	0
1500	55 6a		R	F	C57	11/4/02	High	Yes	1	1	0	1	1	0
1507	55		L	F	C57	11/4/02	High	Yes	1	1	0	1	1	0
1514	55		B	F	C57	11/4/02	High	Yes	1	1	0	1	1	0
1521	55		N	F	C57	11/4/02	High	Yes	1	1	0	1	1	0
1528	56 6b		R	F	C3	11/4/02	Low	No	1	1	0	1	1	0
1535	56		L	F	C3	11/4/02	Low	No	1	1	0	1	1	0
1542	56		B	F	C3	11/4/02	Low	No	1	1	0	1	1	0
1549	56		N	F	C3	11/4/02	Low	No	1	1	0	1	1	0
1556	57 6a		R	F	C3	11/4/02	Low	Yes	1	1	0	1	1	0

Mouse ID	Cage ID	Group	Mark	Sex	Strain	DOB	Diet	Exercise	Scan	Analy.	Mech.	Scan	Analy.	Mech.
1563	57		L	F	C3	11/4/02	Low	Yes	1	1	0	1	1	0
1570	57		B	F	C3	11/4/02	Low	Yes	1	1	0	1	1	0
1577	57		N	F	C3	11/4/02	Low	Yes	1	1	0	1	1	0
1584	58	6b	R	M	C3	11/4/02	Norm	No	1	1	0	1	1	0
1591	58		L	M	C3	11/4/02	Norm	No	1	1	0	1	1	0
1598	58		B	M	C3	11/4/02	Norm	No	1	1	0	1	1	0
1605	58		N	M	C3	11/4/02	Norm	No	1	1	0	1	1	0
1612	59	6a	R	M	C3	11/4/02	Norm	Yes	1	1	0	1	1	0
1619	59		L	M	C3	11/4/02	Norm	Yes	1	1	0	1	1	0
1626	59		B	M	C3	11/4/02	Norm	Yes	1	1	0	1	1	0
1633	59		N	M	C3	11/4/02	Norm	Yes	1	1	0	1	1	0
1640	60	6b	R	F	C3	11/4/02	High	No	0	0	0	0	0	0
1647	60		L	F	C3	11/4/02	High	No	0	0	0	0	0	0
1654	60		B	F	C3	11/4/02	High	No	0	0	0	0	0	0
1661	60		N	F	C3	11/4/02	High	No	0	0	0	0	0	0
1668	61	6a	R	F	C3	11/4/02	High	Yes	1	1	0	1	1	0
1675	61		L	F	C3	11/4/02	High	Yes	1	1	0	1	1	0
1682	61		B	F	C3	11/4/02	High	Yes	0	0	0	0	0	0
1689	61		N	F	C3	11/4/02	High	Yes	1	1	0	1	1	0
1696	62	6b	R	F	C57	11/4/02	Low	No	1	1	0	1	1	0
1703	62		L	F	C57	11/4/02	Low	No	1	1	0	1	1	0
1710	62		B	F	C57	11/4/02	Low	No	1	1	0	1	1	0
1717	62		N	F	C57	11/4/02	Low	No	1	1	0	1	1	0
1724	63a	7a	R	M	C57	1/8/03	Low	Yes	1	1	0	1	1	0
1731	63b		L	M	C57	1/8/03	Low	Yes	1	1	0	1	1	0
1738	63c		B	M	C57	1/8/03	Low	Yes	1	1	0	1	1	0
1745	63d		N	M	C57	1/8/03	Low	Yes	1	1	0	1	1	0
1752	64	7b	R	M	C57	1/8/03	Low	No	1	1	0	1	1	0

Mouse ID	Cage ID	Group	Mark	Sex	Strain	DOB	Diet	Exercise	Scan	Analy.	Mech.	Scan	Analy.	Mech.
1759	64		L	M	C57	1/8/03	Low	No	1	1	0	1	1	0
1766	64		B	M	C57	1/8/03	Low	No	1	1	0	0	0	0
1773	64		N	M	C57	1/8/03	Low	No	1	1	0	1	1	0
1780	65	7a	R	F	C57	1/8/03	Norm	Yes	1	1	0	1	1	0
1787	65		L	F	C57	1/8/03	Norm	Yes	1	1	0	1	1	0
1794	65		B	F	C57	1/8/03	Norm	Yes	1	1	0	1	1	0
1801	65		N	F	C57	1/8/03	Norm	Yes	1	1	0	1	1	0
1808	66a	7b	R	F	C57	1/8/03	Norm	No	1	1	0	1	1	0
1815	66a		L	F	C57	1/8/03	Norm	No	1	1	0	1	1	0
1822	66a		B	F	C57	1/8/03	Norm	No	1	1	0	1	1	0
1829	66a		N	F	C57	1/8/03	Norm	No	1	1	0	1	1	0
1836	66b		?	F	C57	1/8/03	Norm	No	1	1	0	1	1	0
1843	66b		?	F	C57	1/8/03	Norm	No	1	1	0	1	1	0
1850	67a	7a	R	M	C57	1/8/03	High	Yes	1	1	0	1	1	0
1857	67b		L	M	C57	1/8/03	High	Yes	1	1	0	0	0	0
1864	67c		B	M	C57	1/8/03	High	Yes	1	1	0	1	1	0
1871	67d		N	M	C57	1/8/03	High	Yes	1	1	0	1	1	0
1878	68	7b	R	M	C57	1/8/03	High	No	1	1	0	1	1	0
1885	68		L	M	C57	1/8/03	High	No	1	1	0	0	0	0
1892	68		B	M	C57	1/8/03	High	No	1	1	0	1	1	0
1899	68		N	M	C57	1/8/03	High	No	1	1	0	1	1	0
1906	69	7a	R	M	C3	1/8/03	Low	Yes	1	1	0	1	1	0
1913	69		L	M	C3	1/8/03	Low	Yes	1	1	0	1	1	0
1920	69		B	M	C3	1/8/03	Low	Yes	1	1	0	1	1	0
1927	69		N	M	C3	1/8/03	Low	Yes	1	1	0	1	1	0
1934	70	7b	R	M	C3	1/8/03	Low	No	1	1	0	1	1	0
1941	70		L	M	C3	1/8/03	Low	No	1	1	0	0	0	0
1948	70		B	M	C3	1/8/03	Low	No	1	1	0	0	0	0



Mouse ID	Cage ID	Group	Mark	Sex	Strain	DOB	Diet	Exercise	Scan	Analy.	Mech.	Scan	Analy.	Mech.
1955	70		N	M	C3	1/8/03	Low	No	1	1	0	1	1	0
1962	71	7a	R	F	C3	1/8/03	Norm	Yes	1	1	0	1	1	0
1969	71		L	F	C3	1/8/03	Norm	Yes	1	1	0	1	1	0
1976	71		B	F	C3	1/8/03	Norm	Yes	1	1	0	1	1	0
1983	71		N	F	C3	1/8/03	Norm	Yes	1	1	0	1	1	0
1990	72	7b	R	F	C3	1/8/03	Norm	No	1	1	0	1	1	0
1997	72		L	F	C3	1/8/03	Norm	No	1	1	0	1	1	0
2004	72		B	F	C3	1/8/03	Norm	No	1	1	0	1	1	0
2011	72		N	F	C3	1/8/03	Norm	No	1	1	0	1	1	0
2018	73	7a	R	M	C3	1/8/03	High	Yes	1	1	0	0	0	0
2025	73		L	M	C3	1/8/03	High	Yes	1	1	0	1	1	0
2032	73		B	M	C3	1/8/03	High	Yes	1	1	0	1	1	0
2039	73		N	M	C3	1/8/03	High	Yes	1	1	0	1	1	0
2046	74a	7b	R	M	C3	1/8/03	High	No	1	1	0	1	1	0
2053	74a		L	M	C3	1/8/03	High	No	1	1	0	1	1	0
2060	74a		B	M	C3	1/8/03	High	No	1	1	0	1	1	0
2067	74a		N	M	C3	1/8/03	High	No	0	0	0	0	0	0
2074	74b	7b	R	M	C3	1/8/03	Norm	No	1	1	0	0	0	0
2081	74b		L	M	C3	1/8/03	Norm	No	1	1	0	1	1	0
2088	75	8a	R	F	C57	1/15/03	Low	Yes	1	1	0	1	1	0
2095	75		L	F	C57	1/15/03	Low	Yes	1	1	0	1	1	0
2102	75		B	F	C57	1/15/03	Low	Yes	1	1	0	1	1	0
2109	75		N	F	C57	1/15/03	Low	Yes	1	1	0	1	1	0
2116	76	8b	R	F	C57	1/15/03	Low	No	1	1	0	1	1	0
2123	76		L	F	C57	1/15/03	Low	No	1	1	0	1	1	0
2130	76		B	F	C57	1/15/03	Low	No	1	1	0	1	1	0
2137	76		N	F	C57	1/15/03	Low	No	1	1	0	1	1	0
2144	77a	8a	R	M	C57	1/15/03	Norm	Yes	1	1	0	1	1	0

Mouse ID	Cage ID	Group	Mark	Sex	Strain	DOB	Diet	Exercise	Scan	Analy.	Mech.	Scan	Analy.	Mech.
2151	77b		L	M	C57	1/15/03	Norm	Yes	1	1	0	1	1	0
2158	77c		B	M	C57	1/15/03	Norm	Yes	1	1	0	1	1	0
2165	77d		N	M	C57	1/15/03	Norm	Yes	1	1	0	1	1	0
2172	78	8b	R	M	C57	1/15/03	Norm	No	1	1	0	1	1	0
2179	78		L	M	C57	1/15/03	Norm	No	1	1	0	1	1	0
2186	78		B	M	C57	1/15/03	Norm	No	1	1	0	1	1	0
2193	78		N	M	C57	1/15/03	Norm	No	1	1	0	1	1	0
2200	79	8a	R	F	C57	1/15/03	High	Yes	1	1	0	1	1	0
2207	79		L	F	C57	1/15/03	High	Yes	1	1	0	1	1	0
2214	79		B	F	C57	1/15/03	High	Yes	1	1	0	1	1	0
2221	79		N	F	C57	1/15/03	High	Yes	1	1	0	1	1	0
2228	80	8b	R	F	C57	1/15/03	High	No	1	1	0	1	1	0
2235	80		L	F	C57	1/15/03	High	No	1	1	0	1	1	0
2242	80		B	F	C57	1/15/03	High	No	1	1	0	1	1	0
2249	80		N	F	C57	1/15/03	High	No	1	1	0	0	0	0
2256	81	8a	R	F	C3	1/15/03	Low	Yes	1	1	0	1	1	0
2263	81		L	F	C3	1/15/03	Low	Yes	1	1	0	1	1	0
2270	81		B	F	C3	1/15/03	Low	Yes	1	1	0	0	0	0
2277	81		N	F	C3	1/15/03	Low	Yes	1	1	0	1	1	0
2284	82	8b	R	F	C3	1/15/03	Low	No	1	1	0	1	1	0
2291	82		L	F	C3	1/15/03	Low	No	1	1	0	1	1	0
2298	82		B	F	C3	1/15/03	Low	No	0	0	0	0	0	0
2305	82		N	F	C3	1/15/03	Low	No	1	1	0	1	1	0
2312	83	8a	R	M	C3	1/15/03	Norm	Yes	1	1	0	1	1	0
2319	83		L	M	C3	1/15/03	Norm	Yes	1	1	0	1	1	0
2326	83		B	M	C3	1/15/03	Norm	Yes	1	1	0	1	1	0
2333	83		N	M	C3	1/15/03	Norm	Yes	1	1	0	0	0	0
2340	84a	8b	R	M	C3	1/15/03	Norm	No	1	1	0	1	1	0

Mouse ID	Cage ID	Group	Mark	Sex	Strain	DOB	Diet	Exercise	Scan	Analy.	Mech.	Scan	Analy.	Mech.
2347	84a		L	M	C3	1/15/03	Norm	No	1	1	0	1	1	0
2354	84a		B	M	C3	1/15/03	Norm	No	1	1	0	1	1	0
2361	84a		N	M	C3	1/15/03	Norm	No	1	1	0	1	1	0
2368	84b		R	M	C3	1/15/03	Norm	No	1	1	0	1	1	0
2375	84b		N	M	C3	1/15/03	Norm	No	1	1	0	1	1	0
2382	85 8a		R	F	C3	1/15/03	High	Yes	1	1	0	1	1	0
2389	85		L	F	C3	1/15/03	High	Yes	1	1	0	1	1	0
2396	85		B	F	C3	1/15/03	High	Yes	1	1	0	1	1	0
2403	85		N	F	C3	1/15/03	High	Yes	1	1	0	1	1	0
2410	86a 8b		R	F	C3	1/15/03	High	No	1	1	0	1	1	0
2417	86a		L	F	C3	1/15/03	High	No	1	1	0	0	0	0
2424	86a		B	F	C3	1/15/03	High	No	1	1	0	1	1	0
2431	86a		N	F	C3	1/15/03	High	No	1	1	0	1	1	0
2438	86b		R	F	C3	1/15/03	High	No	1	1	0	1	1	0
2445	86b		N	F	C3	1/15/03	High	No	1	1	0	1	1	0
2452	87a 9a		R	F	C57	3/19/03	Low	Yes	1	1	0	1	1	0
2459	88 9b		N	F	C57	3/19/03	Low	No	0	0	0	0	0	0
2466	89 9a		N	M	C57	3/19/03	High	Yes	1	1	0	1	1	0
2473	90 9b		L	M	C57	3/19/03	High	No	1	1	0	1	1	0
2480	91 9a		B	M	C57	3/19/03	Normal	Yes	1	1	0	1	1	0
2487			R	M	C57	3/19/03	Normal	Yes	1	1	0	1	1	0
2494	92a 9b		R	M	C3	3/17/03	Low	No	1	1	0	1	1	0
2501			L	M	C3	3/17/03	Low	No	0	0	0	0	0	0
2508			B	M	C3	3/17/03	Low	No	0	0	0	0	0	0
2515	92b 9b		R	M	C3	3/17/03	Low	No	1	1	0	1	1	0
2522			L	M	C3	3/17/03	Low	No	0	0	0	0	0	0
2529			B	M	C3	3/17/03	Low	No	1	1	0	1	1	0
2536	93 9a		R	M	C3	3/17/03	Low	Yes	1	1	0	1	1	0

Mouse ID	Cage ID	Group	Mark	Sex	Strain	DOB	Diet	Exercise	Scan	Analy.	Mech.	Scan	Analy.	Mech.
2543			L	M	C3	3/17/03	Low	Yes	1	1	0	1	1	0
2550			B	M	C3	3/17/03	Low	Yes	1	1	0	1	1	0
2557	94a	9b	R	M	C3	3/17/03	High	No	1	1	0	1	1	0
2564			L	M	C3	3/17/03	High	No	1	1	0	1	1	0
2571			B	M	C3	3/17/03	High	No	1	1	0	1	1	0
2578	94b	9b	N	M	C3	3/17/03	High	No	1	1	0	1	1	0
2585			B	M	C3	3/17/03	High	No	1	1	0	1	1	0
2592	95	9a	R	M	C3	3/17/03	High	Yes	1	1	0	1	1	0
2599			L	M	C3	3/17/03	High	Yes	1	1	0	1	1	0
2606			B	M	C3	3/17/03	High	Yes	1	1	0	1	1	0
2613	97	9a	R	F	C3	3/17/03	Normal	Yes	0	0	0	0	0	0
2620			L	F	C3	3/17/03	Normal	Yes	1	1	0	1	1	0
2627			B	F	C3	3/17/03	Normal	Yes	1	1	0	1	1	0
2634			N	F	C3	3/17/03	Normal	Yes	1	1	0	1	1	0
2641	98	9b	R	F	C3	3/17/03	Normal	No	0	0	0	0	0	0
2648			L	F	C3	3/17/03	Normal	No	0	0	0	0	0	0
2655			B	F	C3	3/17/03	Normal	No	1	1	0	1	1	0
2662			N	F	C3	3/17/03	Normal	No	1	1	0	1	1	0
2669	99	10a	R	M	C57	3/26/03	Low	Yes	1	1	0	1	1	0
2676	101	10a	N	M	C57	3/26/03	High	Yes	1	1	0	1	1	0
2683	103	10a	R	F	C57	3/26/03	Low	Yes	0	0	0	0	0	0
2690	105	10a	N	F	C57	3/26/03	High	Yes	1	1	0	1	1	0
2697	107	10a	R	M	C3	3/26/03	Normal	Yes	1	1	0	1	1	0
2704			L	M	C3	3/26/03	Normal	Yes	1	1	0	1	1	0
2711			B	M	C3	3/26/03	Normal	Yes	1	1	0	1	1	0
2718	108	10b	R	F	C3	3/24/03	Low	No	0	0	0	0	0	0
2725			L	F	C3	3/24/03	Low	No	0	0	0	0	0	0
2732			B	F	C3	3/24/03	Low	No	1	1	0	1	1	0

Mouse ID	Cage ID	Group	Mark	Sex	Strain	DOB	Diet	Exercise	Scan	Analy.	Mech.	Scan	Analy.	Mech.
2739			N	F	C3	3/24/03	Low	No	1	1	0	1	1	0
2746	109	10a	R	F	C3	3/24/03	Low	Yes	0	0	0	0	0	0
2753			L	F	C3	3/24/03	Low	Yes	0	0	0	0	0	0
2760			B	F	C3	3/24/03	Low	Yes	0	0	0	0	0	0
2767	110	10b	R	F	C3	3/24/03	High	No	0	0	0	0	0	0
2774			L	F	C3	3/24/03	High	No	0	0	0	0	0	0
2781			B	F	C3	3/24/03	High	No	1	1	0	1	1	0
2788			N	F	C3	3/24/03	High	No	1	1	0	1	1	0
2795	111	10a	R	F	C3	3/24/03	High	Yes	1	1	0	1	1	0
2802			L	F	C3	3/24/03	High	Yes	1	1	0	1	1	0
2809			B	F	C3	3/24/03	High	Yes	1	1	0	1	1	0
2816			N	F	C3	3/24/03	High	Yes	1	1	0	1	1	0
2823	113	11a	R	M	C57		Low	Yes						
2830			L	M	C57		Low	Yes						
2837			N	M	C57		Low	Yes						
2844	115	11a	R	M	C57		High	Yes						
2851			L	M	C57		High	Yes						
2858			N	M	C57		High	Yes						
2865	117	11a	R	F	C57		Normal	Yes						
2872			L	F	C57		Normal	Yes						
2879			B	F	C57		Normal	Yes						
2886			N	F	C57		Normal	Yes						
2893	119	11a	R	M	C3		Normal	Yes						
2900			N	M	C3		Normal	Yes						
2907	120	11b	R	M	C3		Low	No						
2914			L	M	C3		Low	No						
2921			N	M	C3		Low	No						
2928	121	11a	R	M	C3		High	Yes						

Mouse ID	Cage ID	Group	Mark	Sex	Strain	DOB	Diet	Exercise	Scan	Analy.	Mech.	Scan	Analy.	Mech.
2935			N	M	C3		High	Yes						
2942	122	11b	R	M	C3		Low	No						
2949			L	M	C3		Low	No						
2956			N	M	C3		Low	No						
2963	123	11a	R	F	C3		Low	Yes						
2970			L	F	C3		Low	Yes						
2977			N	F	C3		Low	Yes						
2984	124	11b	R	F	C3		Low	No						
2991			L	F	C3		Low	No						
2998			B	F	C3		Low	No						
3005			N	F	C3		Low	No						
3012	125	11a	R	F	C3		Low	Yes						
3019			L	F	C3		Low	Yes						
3026			N	F	C3		Low	Yes						
3033	127	11a	R	F	C3		Normal	Yes						
3040			N	F	C3		Normal	Yes						
3047	128	12b	N	F	C3		Normal	No						
3054	130	12b	R	F	C3		High	No						
3061			L	F	C3		High	No						
3068			N	F	C3		High	No						